

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

CHAS. HUDE A/S
33, H.C. Andersens Boulevard
DK-1553 Copenhagen V
DANEMARK

Date of mailing (day/month/year) 10 January 2000 (10.01.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 71886 Si/Ve	
International application No. PCT/DK99/00665	International filing date (day/month/year) 29 November 1999 (29.11.99)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 30 November 1998 (30.11.98)
Applicant NORDIC SUPERCONDUCTOR TECHNOLOGIES A/S et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed to Rule 17.1(c)** which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed to Rule 17.1(c)** which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
30 Nove 1998 (30.11.98)	PA 1998 01577	DK	15 Dece 1999 (15.12.99)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer Marie-José Devillard Telephone No. (41-22) 338.83.38
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PATENT COOPERATION TREATY

WO 00/33393
PCT/DK99/00665

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

CHAS. HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V
DANEMARK

Sagstype <i>PT</i>	J.nr. <i>71886</i>	Ing. <i>SL</i>
16 JUNI 2000		

AC 400

Til hvem

NO

MSH

IMPORTANT NOTICE

Date of mailing (day/month/year) 08 June 2000 (08.06.00)		
Applicant's or agent's file reference 71886 Si/Ve		
International application No. PCT/DK99/00665	International filing date (day/month/year) 29 November 1999 (29.11.99)	Priority date (day/month/year) 30 November 1998 (30.11.98)
Applicant NORDIC SUPERCONDUCTOR TECHNOLOGIES A/S et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

AU,CN,JP,KP,KR,MA,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,
GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,
PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on

08 June 2000 (08.06.00) under No. WO 00/33393

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.


The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 71886 SI/TK	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK99/00665	International filing date (day/month/year) 29/11/1999	Priority date (day/month/year) 30/11/1998
International Patent Classification (IPC) or national classification and IPC H01L39/24		
Applicant NORDIC SUPERCONDUCTOR TECHNOLOGIES A/S et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 4 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 		
Date of submission of the demand 02/06/2000	Date of completion of this report 08.03.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Van den Berg, G Telephone No. +49 89 2399 2499	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK99/00665

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

4,5	as originally filed		
1-3,3a	as received on	05/12/2000 with letter of	04/12/2000

Claims, No.:

1-11 as originally filed

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK99/00665

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims
	No:	Claims 1, 4, 10, 11
Inventive step (IS)	Yes:	Claims
	No:	Claims 2, 3, 5 - 9
Industrial applicability (IA)	Yes:	Claims 1 - 11
	No:	Claims

- 2. Citations and explanations**
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK99/00665

EP 0 449 316 A describes an oxide superconducting wire and a method of preparing the same. According to this document, prior art superconducting wires of the type under consideration are so inferior in distortion resistance of critical density that the critical density is reduced when the superconducting wire is bent at a certain curvature level (cf. D1, page 2, lines 27 - 29). The method disclosed includes a step of producing a high T_c superconducting tape nor a high T_c superconducting wire with a metal sheath comprising a number of annealing steps (cf. page 2, lines 52 - 58; page 4, lines 15 - 19). The thus fabricated wire, i.e. the wire after final heat treatment, may be further coated with an organic coat such that the superconducting properties of the fabricated wire can be further stabilised against bending thereby modifying the properties of the wire/tape after the final annealing (cf. D1, page 3, lines 29 - 31; page 2, line 49 - 51).

US 5 296 456 A discloses a further PIT method of manufacturing a ceramic superconductor wherein part of a high-conductivity metal layer which covers a ceramic superconducting layer is converted into a low-conductivity portion so that the AC current loss of the ceramic superconductor is reduced (cf. column 2, lines 45 - 49). This is achieved by alloying a predetermined portion of the high-conductivity layer after the final heat treatment such that said portion is rendered less conductive either electrically or thermally (cf. column 3, lines 53 - 68).

1. (Novelty)

The subject-matter of claim 1 is anticipated by the disclosure of EP 0 449 316 A (cf. page 3, lines 29 - 31; page 4, lines 15 - 19). The subject-matter of claim 1 does therefore not meet the requirement of Article 33(2) PCT.

The surface layer disclosed in EP 0 449 316 A is without ambiguity of low friction. The subject-matter of claim 4 is therefore not new such that it does not meet the requirement of Article 33(2) PCT.

The subject-matter of claims 10 and 11 is also known from EP 0 449 316 A (see passages cited above).

2. (Inventive step)

Dependent claims 2, 3 and 5 - 9 concern merely straightforward possibilities from

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK99/00665

which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed (cf. description of the underlying international application, page 3, lines 10 - 12). In particular, the provision of colour marked surfaces, selection of suitable coating material - once it is known from EP 0 449 316 A that the coating is made of an (electrically insulating) organic material - and standard methods for applying a coating such coating being (UV) curable or solvent based are obvious measures.

The subject-matter of claims 2, 3 and 5 - 9 does therefore not involve an inventive step. Therefore, the subject-matter of these claims does not meet the requirements of Article 33(3) PCT.

3. (Industrial applicability)

The subject-matter of claims 1 - 11 meets the requirement of Article 33(4) PCT.

To point VIII:

Observations under Article 6 PCT (clarity):

The embodiment according to Examples 2 and 3 does not fall within the scope of the wording of claim 1 because according the method claimed in claim 1 an (one) additional surface layer is applied after the final treatment for modifying the properties of the wire/tape (see claim 11).

Consequently, the subject-matter of claim 4 referring back to claim 1 is not clear either. The embodiments do not provide for a single Teflon low friction layer as the additional surface layer. Examples 2 and 3 prescribe an intermediate insulating layer before application of an (outer) Teflon layer. The observation also applies to the content of claim 6.

The wording "surface layers" in claim 7 has no antecedent.

The wording "by applying the insulating layer ..." in claim 8 referring back to claim 1 has no antecedent.

Title: A method of producing a superconducting tape

Technical field

This invention relates to a method of producing a High Tc superconducting tape or a High Tc superconducting wire in a metallic sheath.

5 Background art

A high Tc superconducting wire/tape is usually a composite consisting of a superconducting core and a metallic sheath. Many properties of the wire/tape depend on the metallic sheath materials. Additional layers over the metallic sheath can, however, modify the properties of the wire/tape. For instance

- 10 (1) requires a superconducting device such as a motor, a transformer cable or a magnet additional insulating materials between the wires or between the adjacent turns of the winding in order to prevent short circuiting. According to EP 0 786 783 insulating layers have been applied between the superconducting layers formed by bare Bi-2223 tapes. High Tc wires having insulating surface layers could simplify
15 the process of making superconducting devices and the volume of the devices could be reduced.

- (2) the mechanical strength of a high Tc superconducting wire/tape depends on the sheath material. An Ag alloy sheathed tape is for instance much stronger than a tape sheathed with pure Ag. However, it is difficult to distinguish the Ag alloy from the
20 pure Ag just by looking. The additional surface layer can be coloured or marked which enable to distinguish between different kinds of wires/tapes. It is common that a tape is annealed in a pan-cake or solenoid form. Asymmetry pre-stress could be built up during the annealing and therefore two sides of a high Tc tape could have

different mechanical properties. It is therefore very important to be able to distinguish between the two different sides during a winding process, for instance by using different colours to distinguish between the two sides of the tape, one colour for the tensile stressed side and another colour for the compressed stressed side. As a result
5 a degrading of the wire/tape could be omitted.

(3) the Ag or Ag alloy sheath is not complete gas tight or liquid tight. Long time exposure in air or long time in contact with with liquid nitrogen could cause a degrading of the high Tc wire/tape. An additional layer could protect the tape from moisture, water, liquid nitrogen or other chemicals which could degrade the super-
10 conducting tape.

(4) the additional layer could change the surface friction of the wire/tape. A low friction is for instance needed for winding a superconducting cable.

Such additional layers could be applied by known techniques.

According to US patent specification No. 4 927 985 an insulating layer is applied
15 inside a conductor and the surface of the conductor is metallic. By this construction the insulating layer should be put in the conductor before the mechanical deformation and heat treatment. The materials suitable for the insulating layer are therefore restricted and organic materials cannot be used.

EP0044144 (US4407062) concerns a low Tc superconductor. Low Tc superconductors are totally different from high Tc superconducting materials. The low Tc materials mentioned in EP 0044144 is intermetallic. High Tc superconductors are ceramic.
20 The method for producing the low Tc superconductor is therefore different from the method for producing high Tc superconductors.

Moreover the coating according to EP0044144 is applied before the final heat treatment.

The coating materials are therefore for high temperature use and could for instance be composite of silicate, chalk and China clay.

- 5 Without high temperature firing the coating is not stable. It can be simply removed by wiping in hot water and wiping conf. page 10 lines 7-10.

From EP 04449316 A1 it is known to cover a superconducting wire with an organic coat so as to stabilize the superconducting wire against bending.

Brief description of the invention

- 10 The object of the invention is to illustrate how the restriction as to the materials could be omitted and according to the invention the additional layer/layers is/are applied after the final annealing. As a result the above-mentioned problems have been solved.

According to the invention the coating is performed after the final heat treatment and the coating materials are typically polymers.

- 15 By using a coloured or a marked surface layer one will be able to distinguish between the different wires or different portions of the same wire, for instance to mark one of the sides of the wire/tape.

According to the invention the surface layer could have a low friction and for instance being composed of teflon. Low friction is for instance needed for winding of
20 a superconducting cable.

3a

Brief description of the drawings

In the following the invention will be disclosed in closer detail with reference to the attached figures.

AMENDED CLAIMS

[received by the International Bureau on 08 May 2000 (08.05.00);
original claim 1 amended; remaining claims unchanged (1 page)]

1. A method of producing a high Tc superconducting tape or a high Tc superconducting wire with a metal sheath, said method comprising a number of annealing steps, characterised in that an additional surface layer for modifying the electrical properties of the wire/tape is applied after the final annealing.
5
2. A method according to claim 1, characterised by a surface layer of electrical insulating material.
3. A method according to claim 1, characterised by using a coloured or a marked surface layer so as to be able to distinguish between different wires or different portions of the same wire, for instance to mark one of the sides of the wire/tape.
10
4. A method according to claim 1, characterised by a surface layer having a low friction.
5. A method according to claim 4, characterised in that the surface layer with a low friction is composed of teflon.
- 15 6. A method according to claim 1, characterised in that the coating material is polyurethane, polyesterimide, epoxy, teflon or another insulating material.
7. A method according to claim 6, characterised in that the surface layers contain ceramic powder, graphit, carbon, fiber or metallic particles/fibres.
8. A method according to claim 1, characterised by applying the insulating layer by painting, coating, DIP-coating, spaying or dry powder coating.
20